

Listing of the Claims

Claim 1: (Currently Amended) A surface-profiling method comprising:

~~projecting a two-dimensional pattern of alternating relatively lighter and relatively darker regions of varying widths upon a surface at a first angle relative to said surface;~~

projecting a two-dimensional pattern upon a surface at a first angle relative to said surface, wherein said pattern has a length and a width, and is formed of alternating relatively lighter and relatively darker regions of varying lengths;

capturing an image of said pattern from a second angle relative to said surface; and

processing said image to produce a profile of said surface;

producing an image signal in response to said image; and correlating said image signal with a reference signal corresponding to said pattern projected by said projecting activity to produce said profile of said surface.

Claim 2: (Original) A surface-profiling method as claimed in claim 1 wherein:

said projecting activity projects discrete multiple ones of said patterns;

said capturing activity captures an image of each of said patterns; and

said processing activity processes each of said images.

Claim 3: (Original) A surface-profiling method as claimed in claim 1, wherein said pattern has a length and a width, said method additionally comprising:

affixing to a vehicle a projector configured to effect said projecting activity, wherein said vehicle is configured to move

AMENDMENT

SERIAL NO. 09/864,105

Page: 4

in a vehicular direction and said projector is configured to project said pattern so that said width is substantially perpendicular to said vehicular direction;

affixing to said vehicle a camera configured to effect said capturing activity; and

moving said vehicle over said surface in said vehicular direction while effecting said projecting and capturing activities so as to obtain said captured image.

Claim 4: (Original) A surface-profiling method as claimed in claim 3 additionally comprising:

repeating said projecting and capturing activities at intervals along said vehicular direction to obtain a series of said captured images; and

deriving a profile of said surface in substantially said vehicular direction from said series of said captured images.

Claims 5 and 6: (Canceled).

Claim 7: (Currently Amended) A surface-profiling method as claimed in claim 1 additionally comprising:

partitioning said image into at least one image region, wherein one said image region is responsive to a portion of said pattern projected upon said surface;

producing an image signal in response to said one image region;

correlating said image signal with ~~a referencee said reference~~ signal configured to correspond to said image region to produce a correlation signal; and

determining, in response to said correlation signal, a relative height of said surface upon which said portion of said pattern was projected.

AMENDMENT

SERIAL NO. 09/864,105

Page: 5

Claim 8: (Currently Amended) A surface-profiling method as claimed in claim 1 additionally comprising:

partitioning said image into at least twenty-five image regions, wherein one of said image regions is responsive to a portion of said pattern projected upon said surface;

producing an image signal in response to said one image region;

correlating said image signal with ~~a reference~~ said reference signal configured to correspond to said one image region to produce a correlation signal; and

determining, in response to said correlation signal, a relative height of said surface upon which said portion of said pattern was projected.

Claim 9: (Currently Amended) A surface-profiling method as claimed in claim 1 additionally comprising:

partitioning said image into at least twenty five image regions, wherein each of said image regions is responsive to a portion of said pattern projected upon said surface;

producing a plurality of image signals, wherein one of said image signals is produced in response to each of said image regions;

correlating each of said image signals with ~~a reference~~ ~~and~~ said reference signal configured to correspond to said each image region to produce a correlation signal;

determining, in response to each of said correlation signals, a relative height of said surface upon which said portion of said pattern was projected; and

producing said surface profile from said plurality of relative heights.

Claim 10: (Currently Amended) A surface-profiling method as claimed in claim 1 wherein said surface has a longitudinal

AMENDMENT

SERIAL NO. 09/864,105

Page: 6

direction and a transverse direction substantially perpendicular to said longitudinal direction, wherein said two-dimensional pattern has a length and a width, wherein said projecting activity projects said two-dimensional pattern so that said length of said pattern is substantially coincident with said longitudinal direction of said road surface and said width of said pattern is substantially coincident with said transverse direction of said road surface, and wherein said surface-profiling method additionally comprises:

partitioning said image into at least one image region, wherein said image region is responsive to a portion of said pattern projected upon said surface in said transverse direction;

producing an image signal in response to said one image region;

correlating said image signal with a ~~reference~~ said ~~reference~~ signal configured to correspond to said image region to produce a correlation signal;

determining, in response to said correlation, a relative height of said surface upon which said portion of said pattern was projected;

repeating said projecting, capturing, partitioning, producing, correlating, and determining activities multiple times to produce a series of said relative heights of said road surface transverse profiles of said road surface; and

deriving a longitudinal profile of said road surface from said series of said relative heights of said road surface.

Claim 11: (Currently Amended) A surface-profiling system comprising:

~~a projector configured to project a two-dimensional pattern of alternating relatively lighter and relatively darker regions of varying widths upon a surface from a first angle;~~

a projector configured to project a two-dimensional pattern upon a surface from a first angle, said pattern having a length and a width, and formed of alternating relatively lighter and relatively darker regions of varying lengths;

a camera configured to capture an image of said projected pattern from a second angle; and

a computer configured to produce a profile of said surface from said captured image in response to a reference signal corresponding to said pattern projected by said projector.

Claim 12: (Original) A surface-profiling system as claimed in claim 11 wherein said pattern comprises:

at least three of said relatively lighter regions extending across a width of said pattern; and

at least two of said relatively darker regions extending across said width of said pattern, wherein each of said relatively darker regions is positioned between adjacent ones of said relatively lighter regions, and wherein said relatively lighter regions and said relatively darker regions together form a length of said pattern substantially perpendicular to said width thereof.

Claim 13: (Original) A surface-profiling system as claimed in claim 12 wherein:

said surface is a road surface having a longitudinal direction and a transverse direction substantially perpendicular to said longitudinal direction;

said two-dimensional pattern is projected upon said road surface so that said width of said pattern is substantially coincident with said transverse direction of said surface; and
said profile is a transverse profile of said road surface.

AMENDMENT

SERIAL NO. 09/864,105

Page: 8

Claim 14: (Original) A surface-profiling system as claimed in claim 13 wherein:

said projector, camera, and processor are together configured to produce a series of said transverse profiles wherein each of said transverse profiles in said series is a transverse profile at a different distance along said longitudinal direction of said road surface; and

said computer is additionally configured to derive a longitudinal profile of said road surface from said series of said transverse profiles.

Claim 15: (Original) A surface-profiling system as claimed in claim 11 wherein:

said two-dimensional pattern has a width and a length;

said camera is a first camera configured to capture a first image of said pattern over a first portion of said width;

said system comprises a second camera configured to capture a second image of said pattern over a second portion of said width;

said computer is configured to integrate said first and second captured images and produce a profile of said surface therefrom.

Claim 16: (Original) A surface-profiling system as claimed in claim 11 wherein:

said projector is configured to project said pattern with said relatively lighter regions of substantially a predetermined monochromaticity; and

said camera is filtered to be sensitive to said relatively lighter regions of substantially said predetermined monochromaticity.

AMENDMENT

SERIAL NO. 09/864,105

Page: 9

Claim 17: (Original) A surface-profiling system as claimed in claim 16 wherein:

said projector comprises a laser; and

said laser produces said relatively lighter regions of substantially said predetermined monochromaticity.

Claim 18: (Original) A surface-profiling system as claimed in ~~claim 16~~ claim 11 wherein said projector is a stroboscopic projector.

Claim 19: (Original) A surface-profiling method as claimed in claim 11 wherein said two-dimensional pattern is formed of a plurality of said relatively lighter regions separated by said relatively darker regions and projected over a width of said pattern, and has a length substantially perpendicular to said width.

Claim 20: (Original) A surface-profiling method as claimed in claim 11 wherein said two-dimensional pattern is configured to have a higher mathematical autocorrelation function in one direction.

Claim 21: (Currently Amended) A surface-profiling system comprising:

a vehicle configured to move in a vehicular direction upon a surface having a longitudinal direction and a transverse direction substantially perpendicular to said longitudinal direction, said vehicular direction being substantially coincident with said longitudinal direction;

a projector affixed to said vehicle and configured to project a series of two-dimensional patterns ~~of alternating relatively lighter and relatively darker regions of varying widths~~ upon said surface as said vehicle moves in said vehicular

AMENDMENT

SERIAL NO. 09/864,105

Page: 10

direction, wherein said patterns are projected at a first angle substantially perpendicular to said surface, and wherein said patterns have a length and a width, and wherein said patterns are formed of relatively lighter and darker regions of varying length, said lengths being substantially coincident with said longitudinal direction, and said width being substantially coincident with said transverse direction;

a camera affixed to said vehicle and configured to capture images of said projected patterns from a second angle oblique to said surface as said vehicle moves in said vehicular direction; and

a computer configured to produce a transverse profile of said surface from each of said captured images in response to a reference signal corresponding to said patterns projected by said projector, and configured to derive a longitudinal profile of said surface from a plurality of said transverse profiles.